

A new genus and species of Spilomelinae (Lepidoptera, Pyralidae) from the Galapagos Islands, Ecuador

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A new genus and species of Spilomelinae (Lepidoptera, Pyralidae) from the Galapagos Islands, Ecuador. - *Cheverella galapagensis* Landry, gen. n. and sp. n. is described as an endemic of the Galapagos Islands, Ecuador. Based on a combination of two apomorphies (reduced uncus and presence of setose pads on anterodorsal extensions of the male valva medially) this taxon is possibly related to *Choristostigma* Warren, now placed in the *Hydriris* group of Munroe (1995), but *Cheverella* lacks the setose projection at base of the valve's costa present in *Choristostigma*. The female has a clearly circumscribed corpus bursae with a short, spine-like signum. *Cheverella* also shares a few characters with members of the *Siga* group. The larva is a borer in stems of the endemic *Tournefortia pubescens* Hook. f. (Boraginaceae).

INTRODUCTION

During his first expedition to the Galapagos in 1989 at the onset of his inventory of the Lepidoptera of the archipelago, B. Landry (BL) came across the nicely patterned pyraloid treated here, and began to investigate its generic affinities. The double praecinctorium pointed to a Spilomelinae, and along the years since 1989 the species was shown to several colleagues (James Hayden, Eugene Munroe, Matthias Nuss, Michael Shaffer, Alma Solis), who concluded that it was undescribed and that it did not belong to any described genus, while various proposals were made with regard to phylogenetic affinity to other genera. In 1983, Eugene Munroe had, in fact, examined a specimen preserved in the Museum of Comparative Zoology, Cambridge, Massachusetts, and added a label saying 'New Pyraustine', a group which at the time included the Spilomelinae.

Here this new taxon is finally described. Its recognition will allow for an evaluation of its conservation status and to plan future studies on its ecology.

With more than 3700 species described, the Spilomelinae is one of the two largest subfamilies of the Pyraloidea, a group including either one (Pyralidae) or two (Crambidae and Pyralidae) families, depending on authors. It is included in the monophyletic group of pyraloid subfamilies here referred to as Crambiformes (the Crambidae, or Crambinae), the other group of subfamilies being known as Pyralidae s. str., or Pyralinae, or Pyraliformes. Munroe (1995) treated the subfamily as a tribe of Pyraustinae and recorded 1437 species in the Neotropical Region. The Spilomelinae are believed to be polyphyletic (Minet, 1982; Solis & Maes, 2003), but this has never been tested. The moths are characterized by the absence of chaetosemata, a bilobed praecinctorium, a projecting fornix tympani (tympanic frame), a pointed spinula, the absence of a gnathos, and the absence of a rhomboidal signum on the bursa copulatrix of the female genitalia (Minet, 1982; Nuss *et al.*, 2011). Other diagnostic characters are the loss of the subcostal hamus (frenulum hook) on the male forewing and the male valva with a clasper in some other conformation than in Pyraustinae (Munroe, 1976: 8). When *Cheverella* is compared with the matrix and characters used by Solis & Maes (2003) in their phylogenetic analysis of the crambiforme subfamilies, the genus scores as a representative of the Spilomelinae for all 17 characters used, although the shape of the median ridge of the tegumen is here complete from base to apex, not u-shaped at base.

In the Galapagos Islands, there are 42 species of Spilomelinae currently known, of which nine are undescribed and under investigation (BL, unpublished).

MATERIAL AND METHODS

Specimens were collected mostly by BL at light during five expeditions to all of the major islands of the Galapagos in 1989, 1992, 2002, 2004, and 2005. The 1989 material was deposited at the Canadian National Collection of Insects, Ottawa, Canada (CNC) while most of the rest is deposited in the Muséum d'histoire naturelle, Geneva (MHNG). Many valuable specimens, including the single reared specimen came from co-author L. Roque-Albelo while he worked at the Charles Darwin Research Station, on Santa Cruz Island, Galapagos (CDRS). Additional material came from the California Academy of Sciences, San Francisco, California, USA (CAS), the Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, USA (MCZ), and the Natural History Museum, London, U.K. (BMNH).

The terminology of the tympanal organs follows Landry (1995). That of genitalia follows Solis & Maes (2003). The manner of giving the label data of the holotype and paratypes is presented in Landry (2006) as are the methods used for specimen collecting.

DESCRIPTIONS

Cheverella Landry gen. n.

Figs 1–8

Type species: *Cheverella galapagensis* sp. n.

Gender: feminine.

DIAGNOSIS: *Cheverella* can be separated from the other genera of Spilomelinae by two apomorphies of the male genitalia, i.e. the reduced uncus and the presence of



FIGS 1-2

Cheverella galapagensis Landry, sp. n. (1) Holotype (CNC). (2) Darker coloured female paratype (MHNG).

setose pads on anterodorsal extensions of the valva mediobasally, and the clearly circumscribed corpus bursae with a short, spine-like signum in the female. *Choristostigma* Warren, a mainly North American genus with nine species, also has a reduced uncus and setose pads on a transtilla or extensions of the valva as in *Cheverella* (*C. elegantalis* Warren and *C. plumbosignalis* (Fernald) examined), but its valva is more narrow and it has a short, setose projection at base of costa. The female genitalia of *Choristostigma* (*C. plumbosignalis* (Fernald) examined) differ more strongly in that the wide ductus bursae has a large colliculum, the papillae anales are elongate rather than triangular, and the signum is very large, oval, and with multiple spines that are 4-5 X longer than their basal width and irregularly distributed.

DESCRIPTION: Head (Fig. 3) with antennae filiform, slightly thinner in female, reaching almost 2/3 of length of forewing, with dense, short ciliation ventrally, with single short seta arising from scale-coated dorsal edge near middle of first 12 flagellomere approximately, with last flagellomere terminating into distinct sensillum styloconicum; with ocelli; without chaetosemata; maxillary palpus very short; labial palpus curved upward at about half right angle, reaching slightly above eye.

Forewing rather narrow, 2.4 X longer than largest width. Frenulum simple in male, with 2 acanthae in female. Retinaculum a short bunch of scales below cubital stem; male without frenulum hook. Wing venation ($n=1$) (Fig. 4): Forewing Sc, R1, and R2 free, latter from before upper angle of cell; R3 and R4 stalked for most of length, stemming from upper angle of cell; R5, M1-3, and CuA1-2 veins free; M1 and M2 well separated at base; M3 from lower angle of cell; 1A+2A clear; 3A faintly indicated. Hindwing with Sc+R1 connected with Rs from 1/2 to 3/4; M1-3, and CuA1-2 veins free; M1 and M2 well separated at base; M2, M3 and CuA1 stemming from lower angle of cell; anal veins clearly distinct. Abdomen: Male intersegmental membrane VIII-IX without associated sclerites or hair-like scales. Sternum VIII broadly sclerotized at base, with short median extension and long, thin lateral extensions reaching apex; tergum VIII with broad sclerotized band along whole segment medially. Female segment VII well sclerotized, narrower and longer than preceding segment, with tergum a large quadrangular plate. Tympanal organs ($n=6$) (Fig. 5): Tergo-sternal sclerite with broadly rounded, deeply concave ventral margin.

Tympanum plane almost at right angle from sternal plane. Tympanic frame slightly projecting ventrad of margin of segment. Tympanic crest short, situated slightly anterad of middle. Tympanic drum short, slightly longer than wide, extending anterad to base of bridge. Transverse ridge slightly concave medially, without tympanic pockets, or unapparent, blending with surface of sternum. Tympanic bridge about 1/3 length of drums. Praecinctorium only slightly bilobed.

Male genitalia (n=3) (Figs 6, 7). Tegumen with wide median ridge, narrowly extended laterally at apex, widened at base and narrowly connected with lateral ridges; area between median and lateral ridges more thinly sclerotized, slightly bulged and with scale sockets, as opposed to bare ridges. Uncus reduced, mostly thinly sclerotised, rounded, apically setose, occasionally with very short median depression dorsally; ventral margin more thickly sclerotized, occasionally with very tiny point medially. Short arms of gnathos (sensu Solis & Metz, 2011) fused with narrow apicolateral ridges of tegumen, narrowly triangular, not connecting medially. Dorsal articulation of valva with vinculum of adjacent type (see Solis & Maes, 2003). Costa of valva with medially directed projection posterad of dorsal articulation of valva with vinculum; projections not connected medially and supporting rounded setose pads ventrally. Valva short, narrowing to half basal width near middle, apically rounded, with digit-like, medio-dorsally recurved projection (sella) medially between pair of ridges, with shallow rounded cavity ventrad of sella, with long, abundant setation on basal part of sella dorsally. Juxta a thin, elongate plate with lobed ventral and apical margins, with short wing-like extensions laterally before middle. Vinculum shorter than tegumen + uncus, narrow, with anterior end curved upward, apically blunt in lateral view. Phallus short, stout, without pronounced coecum penis; vesica with bunch of about 20 short, slender cornuti.

Female genitalia (n=3) (Fig. 8). Papillae anales simple, rounded, setose, unconnected dorsally, with straight sclerotized band at base. Apophyses posteriores straight, reaching middle of segment VIII. Latter with well sclerotized plates laterally, sparsely setose, expanding apicoventrally toward midline, but medially not connected, dorsally approximate on distal half and fused on proximal half. Apophyses anteriores slightly curved and longer than posterior ones, not quite reaching middle of segment VII. Lamella postvaginalis triangular, located at base and between apical ventral extensions of sclerotized plates of segment VIII. Ostium bursae at bottom of cup-like, thinly sclerotized antrum. Ductus bursae with girth about 1/3 width of middle of antrum, more or less ridged on distal half, proximal half gradually expanding, without colliculum. Ductus seminalis arising subdistally, at slightly less than 1/3 of length of ductus bursae from ostium. Corpus bursae circular, with one small, spine-like signum ventrally near distal end.

ETYMOLOGY: The name is derived from a frequent interjection heard in Ecuador, *chévere*, which means great, nice, or cool. The unusual maculation of the moth prompted this interjection, or a synonym, to me and others who examined it. This type of maculation is found in another species of Galapagos Spilomelinae, but not in any other members of this subfamily as far as we know.

BIOLOGY: The caterpillar of *Cheverella galapagensis* is a borer in stems of *Tournefortia pubescens* Hook. f. (Boraginaceae). One moth was reared by Lazaro



FIG. 3

Cheverella galapagensis Landry, sp. n. Head of paratype female from Santa Cruz Island (CNC).

Roque-Albelo in 1999, from a plant growing on the Barranco, just behind the Charles Darwin Research Station on Santa Cruz Island. This endemic species of *Tournefortia* is known to contain pyrrolizidine alkaloids (Roque-Albelo *et al.*, 2009). These are known to protect *Utetheisa connerorum* Roque-Albelo & Landry (Lepidoptera, Arctiidae) (formerly mostly known as *U. galapagensis* (Wallengren)) moths from being consumed by *Eustala* (Araneidae) spiders (Garrett *et al.*, 2008). Whether or not *Cheverella* also stores pyrrolizidine alkaloids remains to be discovered.

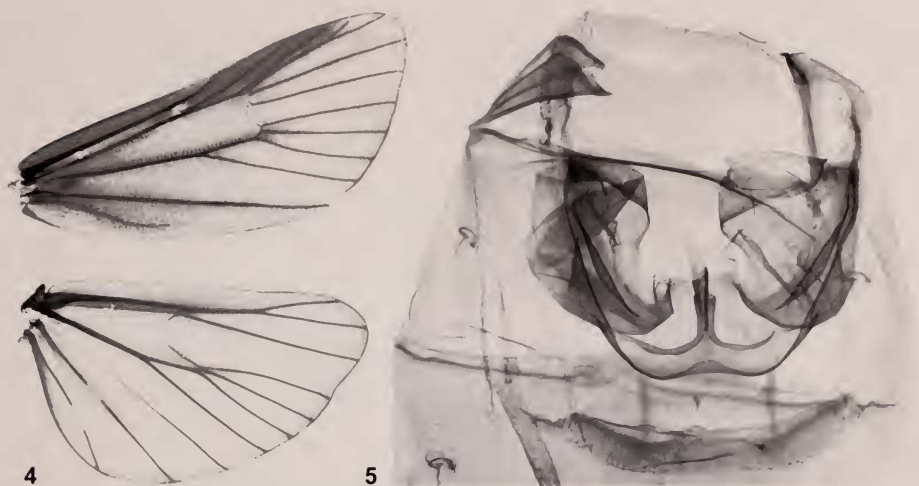
REMARKS: The medially directed projections arising from the costal edge of the valvae posterad from the dorsal articulations of the valvae with the vinculum are not called a transtilla as the definition of this structure is restricted to 'the [dorsal] sclerotisation of the diaphragma' (Solis & Maes, 2003).

SYSTEMATIC POSITION: The current classification of Neotropical Spilomelinae (Munroe, 1995) recognizes 14 groups of genera and 51 unplaced genera. Unfortunately, Munroe did not provide diagnostic characters to support his groups, and there is no classification available for any other Spilomelinae fauna. Therefore, we examined representatives of Munroe's generic groups to find apparently diagnostic character combinations, and we comment on their validity and applicability to the newly described genus. *Cheverella* was found to have affinities with the *Hydriris* and

the *Siga* groups of Munroe (1995). With the *Hydriris* group, *Cheverella* shares a reduced uncus without robust bifid spines and the presence of setose pads in the vicinity of the transtilla in *Choristostigma* Warren. However, in the other genera of the group, the setose pads are in different positions (on the costa in *Geshna* Dyar, on the tegumen in *Hydriris* Meyrick) or absent in *Nehydriris* Munroe. Most of the members of this group share tufts of setae at or around the base of the costa of the valva, but these setae are lacking in *Cheverella* and *Nehydriris*, and the female genitalia vary among the three genera for which they are known. The Diagnosis above explains some of the differences between the female genitalia of *Cheverella* and *Choristostigma*. Those of *Geshna* show a poorly differentiated, elongate corpus bursae without signum, while those of *Hydriris* have a very short ductus bursae and an elongate corpus bursae with an appendix bursae and with two large signa showing about 12 long, thin and curved projections. The labial palpi are variable. They are upturned in *Hydriris* and *Geshna* but porrect with downturned apical meron in *Choristostigma*, so the upwardly directed palpi of *Cheverella* fit in this range. Hence, there is no clear indication that the *Hydriris* group is monophyletic as presently constituted.

The *Siga* group of Munroe (1995) comprises large, robust-bodied Neotropical moths. Our concept of the group is here informed by our addition of *Loxomorpha* Amsel and *Maracayia* Amsel, because they share the same structural characters and known larval habits, despite their much smaller size. So defined, the *Siga* group varies greatly in maculation, but the forewing postmedial line is usually roundly concave on the anal fold. The labial palpi are short or obliquely ascending with a short apical meron. The male genitalia are robust with a moderately inflated sacculus and well-sclerotized costa, and the saccus is absent or weakly developed. The sella is aciculate in most member taxa (as in the *Hydriris* group), but it is quadrate in some (*Cirrhophalina* Munroe) or with a basal process (*Laniifera* Hampson). The uncus is bifid with a short stalk or none at all (with the two uncus arms arising from the tegumen separately), and the apices of the uncus are armed with robust, bifid chaetae. In the female genitalia, where known, the ostium bursae is strongly sclerotized and shaped like a funnel or pitcher plant, and the corpus bursae lacks a signum. Known larvae (*Laniifera*, *Beebea* Schaus, *Loxomorpha*, *Maracayia*) are all borers in Cactaceae. Among these characters, *Cheverella* shares the straight and obliquely ascending labial palpi, robust genitalia with inflated sacculus, and the distally quadrate sella of some members. The breadth of the ostium bursae is similar, but it is only weakly sclerotized in *Cheverella*. The absence of an uncus, bifid or otherwise, would be explained as derived from the reduced bilobate condition seen in *Zeuzerobotys* Munroe. Although *Cheverella* is much smaller than most, it is comparable in size to *Loxomorpha* species. The black and white wing coloration is shared with *Zeuzerobotys*.

The following characters are shared by the two groups and *Cheverella*, so although they do not favor placement in either group, they exclude *Cheverella* from many other spilomeline groups. The valve costa is straight or slightly concave, and the apex of the valve is rounded but attenuate (narrower than the valve width across the costa). The valve sella originates variably from the costal half of the valve or near middle of the valve. The hindwing maculation is nearly absent, and the praecinctorium is weakly (not strongly) bilobed.



FIGS 4-5

(4) *Cheverella galapagensis* Landry, sp. n. Wing venation of paratype male (MHNG). (5) *Cheverella galapagensis* Landry, sp. n. Tympanal organs of paratype male, without praecinctorium (MHNG).

Other characters were examined (tympanal organs, venation) but were found to be either invariant or so variable as to be uninformative of relationships at the level of generic group. The diagnostic characters in these groups (and others) should be evaluated in a phylogenetic context to determine their influence and to help uncover the relationships of *Cheverella*.

The biogeographic relationships of *Cheverella* are ambiguous but suggest testable hypotheses. The *Hydriris* group includes one Neotropical member (*Nehydriris* of southern Brazil) and the cosmopolitan *Hydriris*; the other members range to the southern Nearctic. As far as known, the *Siga* group is exclusively Neotropical to southern Nearctic, with members distributed in many subregions. Among these, *Beebea guglielmi* Schaus is endemic to the Galapagos Islands, so despite the great difference in body size and maculation, the possibility of a close relationship should be considered. If *Cheverella* belongs to the *Siga* group, two hypotheses suggest themselves. A close relationship with *Beebea* would support rapid evolutionary divergence in body size and wing maculation, which might be expected on the Galapagos. Conversely, a closer relationship with a mainland taxon would suggest more than one dispersal event to the islands or a more complex biogeographic scenario. If *Cheverella* is more related to some other spilomeline group, similarly intriguing hypotheses may present themselves. Cladistic and biogeographic analyses of Spilomelinae are greatly needed for choosing among these alternative hypotheses.

Cheverella galapagensis Landry, sp. n.

Figs 1-8

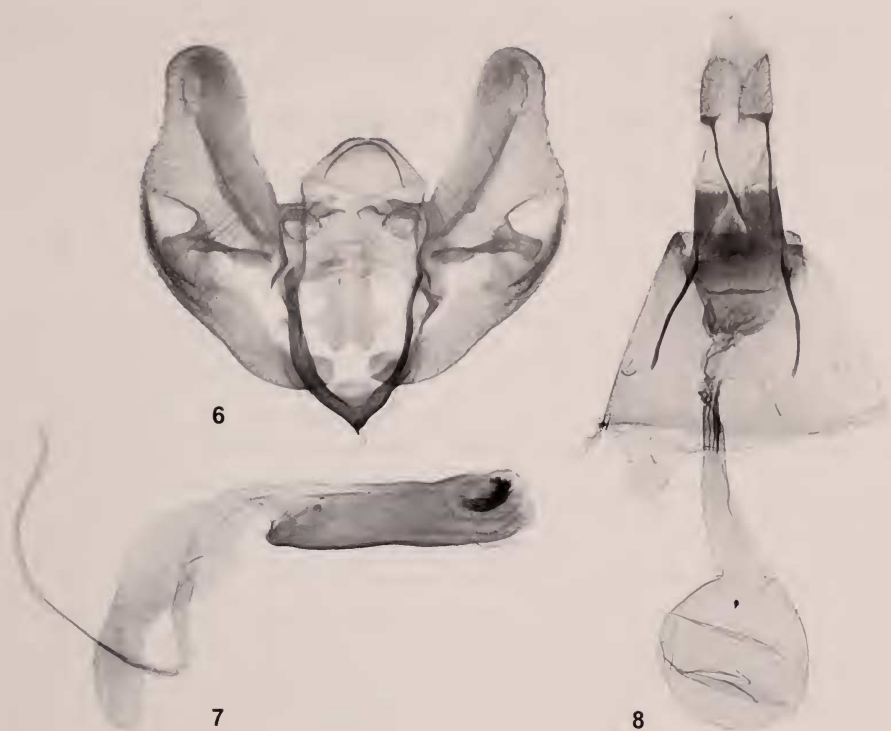
MATERIAL EXAMINED: Holotype male: 1- 'ECUADOR | GALÁPAGOS | Santa Cruz | Los Gemelos | 31.I.1989, M[ercury]V[apour]L[ight] | B. Landry' [printed in black ink on white card stock, with 'ECUADOR' sideways on left]; 2- 'HOLOTYPE | *Cheverella* | galapagensis | B. Landry' [hand-written in black ink on red card stock]. Deposited in the CNC.

PARATYPES: 26 ♂, 49 ♀, 1 of unknown sex from the Galapagos Islands, Ecuador: – *Fernandina*: 1 ♂, SW side, crater rim, G[lobal]P[ositioning]S[ystem]: 1341 m, S 00° 21.910', W 091° 34.034', 12.ii.2005, u[ltra]-v[iolet]l[ight] (B. Landry, P. Schmitz). – *Isabela, Alcedo*: 1 ♀, Lado Este, 700 m elev[ation], 6.iv.1999, uvl-f[?].l[ight] (L. Roque); 1 ♂, 1 ♀, NE slope, about 400 m up (S) Los Guayabillos camp, GPS: 892 m elev., S 00° 25.208', W 91° 04.765', 1.iv.2004, uvl (B. Landry, P. Schmitz); 1 ♂, 1 ♀ (DNA voucher, Lepidoptera, M. Nuss 2007, no. 263), lado NE, 400 m [elev.], camp pega-pega, 15.iv.2002, uvl (B. Landry, L. Roque); 2 ♂, 1 ♀, 570 m elev., 11.x.1998, uvl (L. Roque). – *Isabela, Sierra Negra*: 3 ♂, 11 km N P[uer]to Villamil, 13.iii.1989, M[ercury]V[apour]L[ight] (B. Landry); 1 ♀, same locality, G[lobal]P[ositioning]S[ystem]: S 00° 87.613' [sic], W 91° 0.903', 9.iv.2004, uvl (P. Schmitz); 1 ♀, San[t]o Tomas, 1200 F[ee]t. Alt[itude], 22.viii.1906 (F. X. Williams); 1 ♂, 1 ♀, Alemania, xi.1974 (T.J. de Vries); 2 ♀, Corazon Verde, xi-xii.1974 (T.J. de Vries). – *Isabela, Volcan Darwin*: 1 ♂, 300 m elev., 15.v.1992, MVL (B. Landry); 1 ♂, 630 m elev., 16.v.1992, MVL (B. Landry); 1 ♂ (dissected, slide MHNG ENTO 6070), same data except 17.v.1992; 2 ♂ (one dissected, slide MHNG ENTO 3041), 300 m elev., 20.v.1992, MVL (B. Landry). – *San Cristobal*: 1 ♀ (dissected, slide CNC PYR 366), pampa zone, 18.ii.1989, MVL (B. Landry); 1 ♀, La Toma, ca. 5.6 km East El Progreso, GPS: 299 m elev., S 00° 55.356', W 089° 31.089', 23.ii.2005, uvl (B. Landry). – *Santa Cruz*: 1 ♀, C[harles]D[arwin]R[esearch]S[tation], arid zone, 19.i.1989, MVL (B. Landry); 1 ♀, 4 km N Puerto Ayora, 20.i.1989, MVL (B. Landry); 4 ♀, Media Luna, pampa zone, 21.i.1989, MVL (B. Landry); 2 ♂, 1 ♀, same data as holotype; 1 ♂, C[harles] Darwin Res[earch]. Sta[tion], alt. ± 5 m, 2.ii.1970, at u.v. "blacklight" (R. Silberglied); 1 ♂, Tortuga Res[erve], W S[an]ta Rosa, 6.ii.1989, MVL (B. Landry); 1 of sex unknown, Media Luna, pampa zone, 8.ii.1989, MVL (B. Landry); 1 ♀, Horneman Farm, 220 m, 16.ii.1964 (D. Q. Cavagnaro); 1 ♀, same data except 25.iii.1964; 1 ♀, same data except 30.iii.1964; 3 ♀, same data except 5.iv.1964; 2 ♀, same data except 3.v.1964; 1 ♀, same data except 7.v.1964; 1 ♀, 2 km W Bella Vista, 27.ii.1989, MVL (B. Landry); 1 ♂, Academy Bay, Darwin Research Sta[tion], 27.ii.1964 (D. Q. Cavagnaro); 1 ♂, 3 ♀, [no precise locality], iii.1969, B.M. 1970-172, Ref. No. L.80 (no collector); 1 ♀, E[stacion]C[ientifica]C[harles]D[arwin], 6.iii.1992, uvl (B. Landry); 1 ♂ (dissected, slide MHNG ENTO 6069), transition zone, recently cut road, GPS: S 00° 42.528', W 90° 18.849', 12.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♀, low agriculture zone, GPS: S 00° 42.132', W 90° 19.156', 13.iii.2004, uvl (B. Landry, P. Schmitz); 1 ♀, Finca S[teve]. Devine, 17.iii.1989, MVL (B. Landry); 1 ♂, grassland, 750 m, 6.iv.1964 (D. Q. Cavagnaro); 1 ♂, vic[inity]. "Mirador", W of Media Luna, alt. ± 620 m, 26.v.1970 (Silberglied); 4 ♀ (one dissected, slide MNHG ENTO 6068), Los Gemelos, 27.v.1992, MVL (B. Landry); 2 ♀, Station Darwin, lumière, x.1964 (J. & N. Leleup); 2 ♀, Hacienda Schiess., xi.1974, B.M. 1975-7, Ref. No. L (no collector); 1 ♂, CDRS, Barranco, barrenador de tallos [de] Tournefortia pubescens [sic], emergio 17.xi.1999 (L. Roque); 1 ♀, 80 [referring to note in notebook of ?T. J. de Vries, deposited at CDRS]. – *Santiago*: 1 ♀, N side, GPS: 527 m elev., S 00° 13.690', W 90° 44.135', 5.iii.2005, uvl (P. Schmitz); 1 ♀, Aguacate [camp], 520 m elev., 6.iv.1992, MVL (B. Landry); 3 ♀, Central [camp], 700 m elev., 9.iv.1992, MVL (B. Landry); 1 ♂ (wings on slide MHNG ENTO 3043), 1 ♀, Aguacate, 520 m elev., 12.iv.1992, MVL (B. Landry). Deposited in the BMNH, CAS, CDRS, CNC, MCZ, and MHNG.

ETYMOLOGY: From the name of the archipelago where this species is presumably endemic.

DIAGNOSIS: Currently unique within the genus *Cheverella*, this species can be separated from presumably related taxa as mentioned in the generic diagnosis above. In the Galapagos, this species is unique by virtue of its whitish grey colour with deep dark brown markings on the forewing, head, and thorax. An undescribed species of endemic *Agathodes* Guenée (Pylalidae, Spilomelinae) has a similar colour and pattern, but its wings are narrower and longer, and its hindwing is completely suffused with brown, with a light purple shine.

DESCRIPTION: MALE (n=27) (Fig. 1). Head white with greyish brown as spot between antennae, and ventrally behind eyes. Antenna white, with brown on basal



FIGS 6-8

Cheverella galapagensis Landry, sp. n. Male genitalia of paratype (MHNG). (6) Genitalia without phallus. (7) Phallus. (8) *Cheverella galapagensis* Landry, sp. n. Female genitalia of paratype (CNC).

flagellomeres. Haustellum and maxillary palpus white. Labial palpus mostly white, brown laterally on palpomeres II and III. Thorax white with brown spots as shown, deeper brown (almost black) at collar, greyish brown on metascutellum. Foreleg with greyish brown on dorsal side, white ventrally; midleg white with brown at tips of femur and tibia; hindleg entirely white. Forewing white with deep dark brown spots and lines as shown, sometimes (1 specimen) with more extensive dark brown suffusion, especially between subapical line and outer margin. Forewing length 6.4–9.6 mm (holotype 8.7 mm). Hindwing white with more or less strongly marked subapical and apical lines, except in anal sector. Abdomen mostly white, with some greyish brown dorsally on all or most segments.

Male genitalia: See generic description.

FEMALE (n=49) (Figs 2, 3, 8). Forewing length 7.7–10.3 mm. Female genitalia: See generic description.

REMARKS: As mentioned above, L. R.-A. reared the only known larva from the host plant *Tournefortia pubescens* Hook. f. (Boraginaceae). This taxon is endemic to the Galapagos and found on the islands of Fernandina, Floreana, Isabela, Pinzon, San

Cristobal, Santa Cruz, Santiago, and Wolf (McMullen, 1999). Thus, the moth may also occur on the islands of Floreana, Pinzon, and Wolf, where adults have not yet been collected.

The latitude and longitude data of the specimen collected on Sierra Negra, Isabela, 11 km north of Puerto Villamil, on 9 April 2004 by P. Schmitz were taken in decimal degrees shown above in degrees, minutes, and seconds. In degrees with decimal minutes these data correspond to S 0° 52.568, W 91° 05.418.

ACKNOWLEDGEMENTS

We are thankful to the authorities of Parque Nacional Galapagos and those of the CDRS for allowing and facilitating the field work of B. Landry and L. Roque, and for permits to export specimens. BL is greatly indebted to Stewart B. Peck, his Ph.D. advisor at Carleton University, Ottawa, for taking him on to explore the Galapagos in 1989 and 1992, and for his inspiring companionship in the field. This fieldwork was supported by an operating grant to S. B. Peck from the Natural Sciences and Engineering Research Council of Canada for field research on arthropod evolution. Other much appreciated field companions during one or more of BL's five expeditions to the Galapagos were Novarino Castillo, Charlotte Causton, Joyce Cook, Moraima Inca, José Loaiza, Ricardo Palma, L. Roque-Albelo, Patrick Schmitz, Bradley J. Sinclair, and Eduardo Vilema. BL is also grateful to the Charles Darwin Foundation and the Galapagos Conservation Trust (UK) for providing financial support for his investigations at the BMNH in 2000 and in the Galapagos in 2002. In the BMNH we would like to acknowledge the great support received from curators Michael Shaffer (deceased) and Kevin Tuck. JEH was supported by a Rea Postdoctoral Fellowship (CMNH, Pittsburgh) during his study of Spilomelinae. JEH thanks Alma Solis for providing a manuscript of a revision of the *Polygrammodes* group by E.G. Munroe (deceased), which partly informed the discussion of the *Siga* group. Finally, we thank Philippe Wagneur (MHNG) for his photos of the moths shown here, Florence Marteau (MHNG) for producing the plates, Louis Marcotte (Gatineau, Canada) for helping with GPS data and jargon, pyraloid workers E. Munroe, M. Nuss, M. Shaffer, and Alma Solis for their expertise on this species' taxonomic and systematic status, and the reviewers for their comments.

REFERENCES

- GARRETT, S. E., W. E. CONNER & L. ROQUE-ALBELO 2008. Alkaloidal protection of *Utetheisa galapagensis* (Lepidoptera: Arctiidae) against an invertebrate and a vertebrate predator in the Galapagos Islands. *Galapagos Research* 65: 2–6.
- LANDRY, B. 1995. A phylogenetic analysis of the major lineages of the Crambinae and of the genera of Crambini of North America (Lepidoptera: Pyralidae). *Memoirs on Entomology, International, Gainesville*. Vol. 1. 245 pages.
- LANDRY, B. 2006. The Gracillariidae (Lepidoptera, Gracillarioidea) of the Galapagos Islands, Ecuador, with notes on some of their relatives. *Revue suisse de Zoologie* 113: 437–485.
- MCMULLEN, C. K. 1999. Flowering plants of the Galápagos. *Cornell University Press, Ithaca and London*. xiv + 370 pp.
- MINET, J. 1982. Les Pyraloidea et leurs principales divisions systématiques. *Bulletin de la Société entomologique de France* 86: 262–280.

- MUNROE, E. G. 1976. Pyraustinae, Pyraustini (pp. 1-78). *In*: Dominick, R. B. *et al.* (eds). The Moths of America North of Mexico Fasc. 13.2A, Pyraloidea, Pyralidae (part). *E. W. Classey Limited and the Wedge Entomological Research Foundation*. 78 pp. + plates 1-4 & A-H.
- MUNROE, E. G. 1995. Pyraustinae (pp.53-79). *In*: Heppner, J.B. (ed.), Atlas of Neotropical Lepidoptera, Volume 3. *Association for Tropical Lepidoptera and Scientific Publishers, Gainesville*.
- NUSS, M. B. LANDRY, F. VEGLIANTE, A. TRÄNKNER, R. MALLY, J. HAYDEN, A. SEGERER, H. LI, R. SCHOUTEN, M. A. SOLIS, T. TROFIMOVA, J. DE PRINS & W. SPEIDEL 2011. Global Information System on Pyraloidea. *Museum für Tierkunde, Dresden*. www.pyraloidea.org.
- ROQUE-ALBELO, L., S. E. GARRETT, W. E. CONNER 2009. Darwin's moth: *Utetheisa* in the Galápagos Islands (pp.207-222). *In*: Conner, W.E. (ed.) Tiger Moths and Woolly Bears: Behavior, Ecology, and Evolution of the Arctiidae, Chapter 14. *Oxford University Press, New York*.
- SOLIS, M. A. & K. V. N. MAES 2003. Preliminary phylogenetic analysis of the subfamilies of Crambidae (Pyraloidea Lepidoptera). *Belgian Journal of Entomology* 4: 53-95.
- SOLIS, M. A. & M. A. METZ 2011. Male genital homology based on musculature originating from the tegumen in snout moths (Lepidoptera: Pyraloidea). *Arthropod Structure & Development* 40: 435-448.